

Surname and initials: \_\_\_\_\_

Student number: \_\_\_\_\_

## Examination cover sheet

(to be completed by the examiner)

Course name: Principles of data protection	Course code: 2IMS25
Date: 30/10/2020	
Start time: 13:30	End time: 16:30
Number of pages: 8 (Part A) + 6 (Part B) + 1 (Attachment 1) + 4 (Attachment 2)	
Number of questions: 6	
Maximum number of points/distribution of points over questions: 10	
Method of determining final grade: Final exam	
Answering style: formulation, order, argumentation, multiple choice: open questions	
Exam inspection:	
Other remarks:	

### INSTRUCTIONS FOR STUDENTS AND INVIGILATORS (to be indicated by examiner)

Write in black or blue. Pencil only allowed for drawings.

#### Permitted examination aids (to be supplied by students):

- Computer
- Calculator Graphic
- Calculator
- Lecture notes/book
- One A4 sheet of annotations

Dictionaries. If yes, please specify:

#### Important:

- an exam >90 minutes consists of a Part A and a Part B. Part A needs to be collected after 90 minutes, before handing out part B. Ensure students are aware of this
- students that started on part B of the exam, are only allowed to hand it in and leave the room after the simultaneously conducted online exam part B has started. This is 11.05 (morning), 15.35 (afternoon)
- examinees are only permitted to visit the toilets under supervision
- it is not permitted to leave the examination room within 15 minutes of the start and within the final 15 minutes of the examination, unless stated otherwise
- examination scripts (fully completed examination paper, stating name, student number, etc.) must always be handed in
- the house rules must be observed during the examination
- the instructions of subject experts and invigilators must be followed
- keep your work place as clean as possible: put pencil case and

breadbox away, limit snacks and drinks

- examinees are not permitted to share examination aids or lend them to each other

#### During written examinations, the following actions will in any case be deemed to constitute fraud or attempted fraud:

- using another person's proof of identity/campus card (student identity card)
- having a mobile telephone or any other type of media-carrying device on your desk or in your clothes
- using, or attempting to use, unauthorized resources and aids, such as the internet, a mobile telephone, smartwatch, smart glasses etc.
- having any paper at hand other than that provided by TU/e, unless stated otherwise
- copying (in any form)
- visiting the toilet (or going outside) without permission or supervision

The final grade will be announced no later than fifteen working days after this examination took place. Final grades of first-year bachelor study components in Q4 will be announced within 5 working days. Final test grades of bachelor study components in the interim period will be announced no later than 5 working days before the 1<sup>st</sup> of September.

**Exercises**

1	2	3
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**Surname, First name**

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**Principles of data protection (2IMS25)**  
Exam 30/10/2020 (OnCampus - Part A)  
30 October 2020 13:30 - 15:00

1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	3	3	3	3	3	3
4	4	4	4	4	4	4
5	5	5	5	5	5	5
6	6	6	6	6	6	6
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9
0	0	0	0	0	0	0



**MAC**

Let *HIGH*, *MEDIUM* and *LOW* be integrity levels (ordered from the highest to the lowest), and *Navy* and *Army* two categories. Consider the following subjects and objects along with their integrity class:

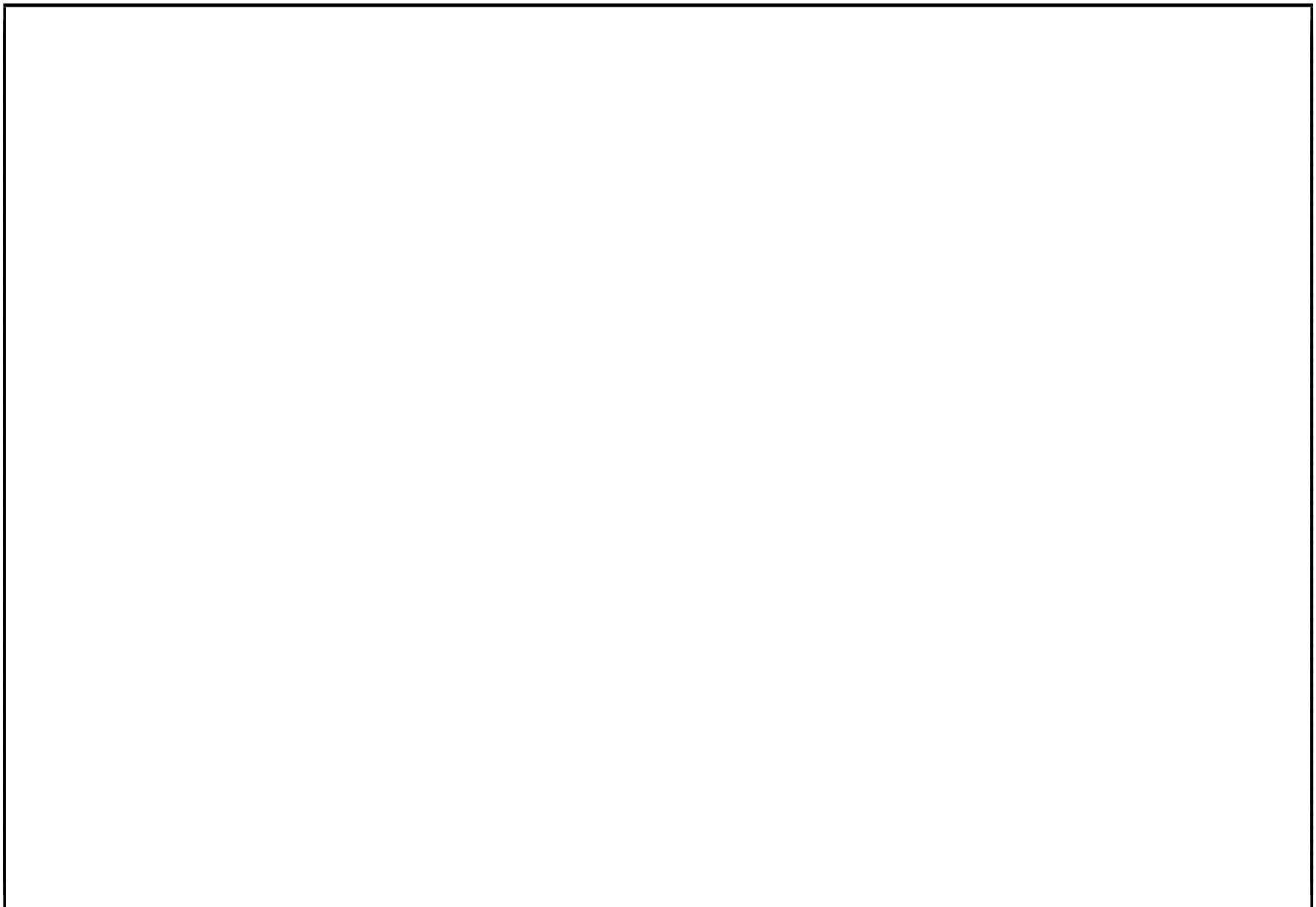
**Subject Integrity**

Colonel (HIGH,Navy)  
Major (MEDIUM,Army)  
Captain (MEDIUM,Army,Navy)  
Soldier (LOW,Army)

**Object Integrity**

Army position (HIGH,Army)  
Fleet position (HIGH,Navy)  
Number of army units (MEDIUM,Army)  
Number of navy units (MEDIUM,Navy)  
Cost of army units (LOW,Army)  
Cost of navy units (LOW,Navy)

0.3p **1a** Draw the lattice of classifications.



1.2p **1b** Answer the following questions based on the Biba model with low-watermark for subjects:

1. Can the colonel read the number of army units?
2. Can the colonel change the fleet position, after he read the number of army units?
3. Can the major change the number of navy units, after the captain read it?
4. Can the captain change the cost of navy units, after he read the army position?
5. Can the captain change the cost of the overall defense (i.e., army and navy) units?
6. Can the soldier read the army position, after he modified it?

Justify your answer.

**Hint:**

- Changing an object requires 'write' rights over the object.
- Computing requires 'read' rights over the (input) objects.

**RBAC**

- 1.5p **2** RBAC has been proposed to facilitate the specification and management of permissions compared to earlier access control models. Nonetheless, RBAC is not scalable. Briefly discuss the limitations of RBAC and conceive a situation in which these limitations arise. Discuss how these limitations can be addressed.

**RT**

- 1p **3a** Explain the differences between (a) rule-based trust management and (b) reputation based trust management. Afterwards, explain what they have in common.

1p **3b** Consider the following  $RT_0$  policy.

$$A.r \leftarrow A.t.s$$

$$A.t \leftarrow B.t$$

$$A.t \leftarrow C.t$$

$$A.v \leftarrow A$$

$$A.v \leftarrow K$$

$$B.t \leftarrow B.r.v$$

$$B.r \leftarrow A$$

$$B.r \leftarrow B$$

$$B.v \leftarrow A$$

$$K.s \leftarrow K$$

$$K.s \leftarrow B$$

$$K.s \leftarrow C$$

$$K.t \leftarrow F$$

$$K.t \leftarrow G$$

$$K.t \leftarrow H$$

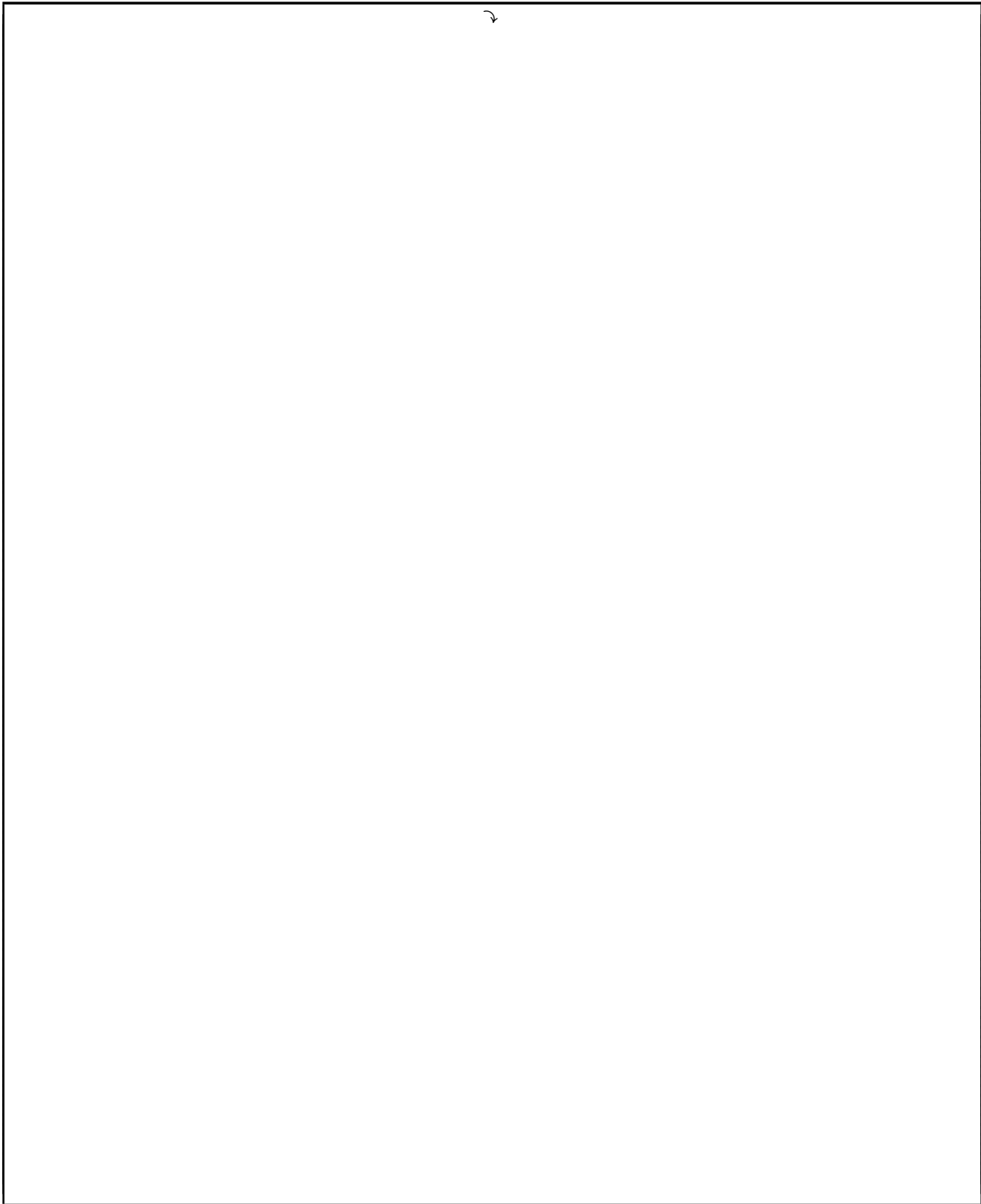
$$K.v \leftarrow L$$

$$K.v \leftarrow M$$

$$K.v \leftarrow N$$

$$J.s \leftarrow J$$

1. Find all principals populating  $A.r$  (which means, compute  $[[A.r]]$ ).
2. Write down the graph generated by the top-down algorithm when computing the semantics of  $A.r$ . (the top-down algorithm is also known as the "backward algorithm").



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